

Observations of the Solar Eclipse, March 6, 1867.

(Communicated by Lord Wrottesley.)

Observations by Mr. Hough, with the 11-foot Equatoreal :

First contact	^h 20	^m 9	^s 27.05	Wrottesley M.T.
End	22	40	44.12	

Observations of First Contact by Lord Wrottesley, with a 46-inch achromatic telescope. Both Sun and Moon quite free from tremours.

First contact $20^h 9^m 28^s.94$ Wrottesley M.T.

The end could not be observed with any accuracy with this telescope, as the wind rose before the termination of the Eclipse, and shook the telescope, which was in an exposed situation, violently. The time registered was $22^h 40^m 33^s$ Wrottesley M.T.

Wrottesley Observatory,
March 6, 1867.

On the Eclipse of March 6, 1867, and a contrivance for viewing the Sun. By John Browning, F.R.A.S.

This eclipse of the Sun was unfortunately rendered invisible by clouds during the greater part of the time, particularly during the interval which corresponded with the *maximum* of the Sun's obscuration. Although from this cause very little could be done, yet some features were noticed which may be worth recording.

I observed the eclipse with Mr. Barnes at his Observatory in Upper Holloway, through an equatoreal reflecting telescope furnished with a silvered glass mirror of $8\frac{1}{2}$ inches diameter. The light and heat of the Sun being of course unbearable in this aperture, the instrument was provided with an arrangement for modifying them, which was, I believe, for the first time applied to a reflector. This contrivance, which I propose to call a *Solar Plane*, consisted of a disk of glass rather more than $\frac{1}{4}$ of an inch thick, mounted in a strong cell and placed on the upper end of the telescope. The glass has plane and parallel sides. On one of the sides of this disk of glass was deposited an exceedingly thin film of pure silver by Liebig's process. This delicate metallic film being turned outwards, having a highly polished surface, reflected nearly the whole of the heat and the greater portion of the light of the Sun's rays, its transparency however being sufficient to enable enough light to pass through it into the telescope to render very small markings on the Sun's surface plainly discernible.

A few days before the eclipse I saw with the assistance of this silvered glass disk three very minute and faint markings, arranged in the form of a triangle on the solar surface. In one of these minute spots the umbra and penumbra could be distinguished.

The body of the Sun seen through the silver film appears of a very cool neutral tint, a colour well adapted for bringing out markings on its surface.

The silvered glass plate I have described is a modification of Foucault's plan of silvering the outer surface of an object-glass, but it avoids the disadvantage of rendering a valuable object-glass useless for any other purpose so long as it is required for solar observations. I think the contrivance far better than a single reflecting prism, or any arrangement adapted to the eye-piece for use with *reflectors*, because it guards the Sun's heat from the telescope, for if the Sun's rays enter the open mouth of the reflector, in a very short time tube currents are set up which almost entirely destroy definition.

When observing the eclipse with the Solar Plane, the first contact of the Moon with the Sun's limb could be scarcely seen for clouds, but at 8^h 20^m the profile of the Moon was plainly seen on the Sun, upon which its continuous encroachment until 8^h 55^m was perceptible.

The mountains on the dark margin of the Moon were beautifully projected upon the luminous disk behind, the protuberances on the S.E. side of the Moon being the most prominent. From the amount of boiling on the edge of the Moon, I regret that I could not draw the form of the protuberances accurately. I have marked in a diagram* the position approximately of the principal mountain, and at the side I have drawn the form of this prominence on a much larger scale. A careful calculation of the exact position of the Moon during her passage across the Sun would, I believe, render the identification of this mountain possible.

From 8^h 55^m to 10^h 11^m the Sun was totally obscured by a mass of dark clouds.

From the readings of a very sensitive thermometer taken during the eclipse, it appeared that the *minimum* temperature was not attained until half an hour after the *maximum* of the eclipse.

I noticed the same result when taking some readings during the eclipse of 1858, when the Sun was also obscured by clouds. Of course the change of temperature during the eclipse was not so great in either case as it would have been, had the sky been cloudless.

At 10^h 40^m the Sun once more became invisible through some rifts in the clouds.

* The diagram referred to and some other diagrams accompanied the original paper.—Ed.

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The profile of the Moon, with a comparatively smooth outline, was now seen passing off from the Sun's disk.

It is known to most observers, that when viewing the heavenly bodies the focus of a telescope is altered by the passage of any considerable amount of mist between the object and the observer. While altering the position of the eye-piece to suit the rapidly changing conditions under which I was observing, I noticed that the flying clouds appeared to have a somewhat granular texture. Bringing the eye-piece much more so as to focus the telescope upon the clouds, I became aware that a tremendous snow-storm was going on in the upper regions of our atmosphere.

The telescope I was using cannot be brought to focus upon any object at a less distance than from 500 to 600 yards, and I should judge as it focussed distinctly on the particles of snow, at some distance shorter than the full length of the focussing tube, that the snow I was looking at must have been nearly half a mile high. The motion being of course magnified by the power of the telescope, snow-flakes passing horizontally across the field of view in front of the Sun at an enormous velocity, presented a most curious spectacle.

As this occurrence took place during the eclipse, and so shortly after the minimum temperature had been noted on the Earth, I think it quite possible that the interception of the solar rays was the cause of the phenomenon.

To unassisted vision the snow presented only the appearance of a slight fleecy cloud, slightly dimming the Sun.

Upper Holloway, March 8.

On the Measurement of the Apparent Disks of Stars.

By G. Knott.

(*Additions to a Paper in the Monthly Notice for January last, p. 87.*)

The agreement with theory, though generally satisfactory, is not exact, owing to the fact that the apparent disk has no measurable boundary. It has been shown by the Astronomer Royal, in his treatise "On the Undulatory Theory of Optics," that if e be the radius of the aperture of a telescope in inches, the extreme diameter of a star disk in seconds, to the first black ring, will be $\frac{2.76}{e}$. In the annexed table I have given, for the telescope apertures employed in the preceding observations, the theoretical disk diameters calculated in accordance with this formula, and have added in a separate column the corresponding observed diameters resulting from